REMARKS

In the Office Action, claims 1-15 stand rejected under 35 U.S.C. § 103(a) for obviousness from the various teachings of U.S. Patent No. 5,383,019 to Farrell et al.; U.S. Patent Application Publication No. 2002/0071117 to Ukon et al.; U.S. Patent No. 5,642,190 to Krupa et al.; U.S. Patent No. 3,692,415 to Shiller; U.S. Patent No. 6,526,355 to Ni et al.; and U.S. Patent Application Publication No. 2003/0192864 to Tanaka et al.

Herein, claims 1, 14, and 15 have been amended as set forth above and claim 9 has been cancelled. After the foregoing amendments, claims 1-8 and 10-15 are pending in the application.

Claims 1 and 14:

Independent claim 1 has been amended to recite, among other things, that a control section receives an output signal from a detector and determines from said output signal that the plasma has collapsed into a toroidal plasma. An RF generator generates power to be applied to the gas with an induction coil in order to heat the gas. The control section is configured to automatically switch off the RF generator and thereby extinguish the plasma when the control section determines that the plasma has collapsed into the toroidal plasma.

Independent claim 14 has been amended to recite, among other things, producing a plasma in a tube of a spectrometer by applying gas to an inductively coupled plasma torch; generating power with an RF generator; and heating the gas to a plasma state by applying the power generated by the RF generator to the gas with the induction coil. An output signal is received from a detector at a control section. The control section determines from the output signal that said plasma has collapsed into the toroidal plasma. The control section responds to determining that the plasma has collapsed into the toroidal plasma by automatically switching off the RF generator and thereby extinguishing the plasma.

Support for the amendments to claims 1 and 14 can be found in Fig. 1 and paragraphs [0031]-[0033] of the publication of the subject application, namely, US 2007/0221634.

In the detailed rejection of claims 1-4, 6, 9, 14, and 15 under 35 U.S.C. § 103(a) in the Office Action, the Examiner admits that the Farrell et al. patent "does not explicitly show

that the detector is for detecting a change in the plasma that collapses into a toroidal plasma in a spectrometer tube." However, the Examiner argues that the Ukon et al. publication "shows that it is known to provide a plasma spectrometer with an optical detector directed in an optical axis that is directed to the plasma for detecting the plasma status including plasma shape which is analyzed by the light generated by the plasma, and Ukon teaches that the plasma status dictates or influences the analytical performance of the plasma torch. Ukon further shows a computer along with a video camera for monitoring the plasma status, including the plasma intensity, image and position."

Paragraph [0022] of the Ukon et al. publication reads as follows:

> [0022] With the present invention, the status of the plasma, such as plasma position, plasma shape and contour, plasma intensity and/or color can be monitored and displayed on line on the same monitoring device such as a monitor screen of the computer unit. Alternatively or simultaneously, the plasma image data can be stored and processed in the memory of the computer unit along with measured data. Processing of image data may comprise obtaining intensity images, intensity contour, color contour, intensity outline and time base fluctuation of image data. Then, the image data and the measured data of the plasma can be easily reviewed later on. In addition, the plasma image data and plasma measured data can be sent to remote places so that the plasma can be monitored from a remote site.

As can be seen, paragraph [0022] of the Ukon et al. publication discloses displaying the monitored conditions online and/or storing and processing plasma image data in the memory of the computer along with measured data. Paragraph [0022] of the Ukon et al. publication further discloses that the processing of plasma image data may comprise obtaining intensity images, intensity color, color contour, intensity outline, and time base fluctuation of image data. The image data and the measured data of the plasma can be easily reviewed later on or sent to remote places for monitoring.

While paragraphs [0014]-[0016] of the Ukon et al. publication disclose various purposes, including control of the plasma, the Ukon et al. publication does not disclose or hint at a control section for receiving an output signal from the detector and for determining from said output signal that the plasma has collapsed into the toroidal plasma. Rather, paragraphs [0024] and [0025] of the Ukon et al. publication disclose that the purpose of monitoring and/or storing

analysis results (such as the most intense position fluctuation or the plasma shape fluctuation) is to enable an operator to determine whether or not the plasma is in requisite condition for normal analysis or later on to set up optimal plasma conditions. No automated feedback control is disclosed or hinted at in the Ukon et al. publication.

In the paragraph bridging pages 4 and 5 of the Office Action, the Examiner argues that the Farrell et al. patent shows a control section that, as modified by the Ukon et al. publication, would have been obvious to further control the plasma to either shut down or power up the power generator depending on the detected plasma status, including a toroidal shaped plasma. Reconsideration is requested.

The first and second full paragraphs in column 5 of the Farrell et al. patent teach adjusting an RF signal applied to inductive coil 3 in response to changes in a plasma shape to maintain optimum power transfer. More specifically, the Farrell et al. patent teaches that in response to a mismatch between the frequency of an oscillator 26 and the resonant frequency of a matching network 32, the power output of an amplifier 29 driven by oscillator 26 is set at a relatively low level during startup of a plasma 2. As plasma 2 begins to form and the resonant frequency of matching network 32 and plasma 2 begins to change, a feedback network adjusts the frequency of oscillator 26 until full power is applied to the inductive coil 3, thus fully establishing the plasma 2. In other words, the Farrell et al. patent teaches away from the present invention by disclosing changing the frequency output by oscillator 26 in response to changing conditions of the plasma 2 - this would include changing the frequency in response to the plasma collapsing into a toroidal plasma. However, the Farrell et al. patent does not disclose or hint at shutting down the plasma 2 under any circumstance.

The Ukon et al. publication does not cure this deficiency in the teachings of the Farrell et al. patent. Specifically, the Ukon et al. publication does not disclose a control section coupled to the plasma generating device 1 or any feedback control of plasma generating device 1 by computer unit 9. Rather, as discussed above, paragraph [0025] of the Ukon et al. publication discloses that the purpose of acquiring the status of a plasma is to enable an operator to determine whether or not the plasma is in requisite condition for normal analysis or, later on, to set up optimal plasma conditions. There is, however, no processing of the plasma image

disclosed in the Ukon et al. publication for the purposes of effecting automated control of the plasma device, especially automatically switching off the RF generator thereby extinguishing the plasma in response to the plasma collapsing into a toroidal plasma. To this end, there is no connection shown or described in the Ukon et al. publication between plasma device 1 and computer unit 9. Hence, the Ukon et al. publication cannot teach or hint at automatically switching off the RF generator and thereby extinguish the plasma when control section (of computer unit 9) determines that the plasma has collapsed into the toroidal shape - as is expressly required in claim 1.

Regarding the Examiner's allegation that "Farrell shows a control section that, as modified by Ukon, it would have been obvious to further control the plasma to either shut down or power up the power generator depending on the detected plasma status including a toroidal shaped plasma", inasmuch as the Ukon et al. publication does not disclose any feedback control of plasma device 1 by computer unit 9, it cannot be obvious to provide the control section of claim 1 which is configured to automatically switch off the RF generator and thereby extinguish the plasma when the control section determines that the plasma has collapsed into the toroidal plasma. To this end, modifying the Farrell et al. patent by the teachings of the Ukon et al. publication (which involves operator intervention) would produce a system wherein operator intervention is required to control the plasma - not a control section configured to automatically switch off the RF generator and thereby extinguish the plasma when the control section determines that the plasma is collapsed into the toroidal plasma.

The Krupa et al. and Shiller patents do not cure the foregoing deficiencies in the teachings of the Farrell et al. patent and the Ukon et al. publication.

Similar comments apply in respect of the limitation of claim 14 that the control section responds to determining that the plasma has collapsed into the toroidal plasma by automatically switching off the RF generator and thereby extinguishing the plasma.

Absent disclosing a spectrometer and a method having all the limitations of claims 1 and 14, respectively, the Farrell et al. patent, the Ukon et al. publication, the Krupa et al. patent, and/or the Shiller patent, either individually or in combination, cannot anticipate or render obvious claims 1 and 14, or claims 2-8, 10-13, and 15 dependent therefrom.

Claims 2 and 15:

Regarding the Examiner's allegation in the paragraph bridging pages 4 and 5 of the Office Action that "as Ukon teaches for detecting the plasma shape including its contour, it would include the top or tail position of the plasma that will exits [sic]. Further Ukon shows the plasma device is oriented in an optical axis of the spectrometer and this teaching meets the recited optical detector that is directed at a position of the plasma which would include a top or tail portion", there is no disclosure in the Ukon et al. publication that detector 4 of detector device 2 provides an output signal that changes with the light intensity falling on it. To this end, there is no disclosure in the Ukon et al. publication of the function of detector 4. Notwithstanding, since there is no connection between computer unit 9 and plasma generating device 1 in the Ukon et al. publication, computer unit 9 simply cannot use the output of detector 4 for automatically controlling the operation of plasma generating device 1 in any manner. Rather, the Ukon et al. publication suggests that detector 4 will continue to monitor the plasma via entrance slit to 3 regardless of the shape of the plasma. Simply put, there is simply no disclosure or hint in the Ukon et al. publication of detecting a single position (e.g., the top region or tail) of the plasma for light intensity and making a decision whether to automatically switch off the plasma generating device 1 thereby extinguishing the plasma upon determining that the plasma has collapsed into a toroidal plasma.

Absent disclosing or hinting all the limitations of claims 2 and 15, the Farrell et al. patent, the Ukon et al. publication, the Krupa et al. patent, and the Shiller patent, either individually or in combination, cannot anticipate or render obvious claims 2 and 15, or claim 13 dependent from claim 2.

CONCLUSION

Based on the foregoing amendments and remarks, reconsideration of the rejections and allowance of claims 1-8, and 10-15 are requested.

Respectfully submitted,

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